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THE NEW CONCRETE

PROGRESS during the last 20 years or so in the use of concrete for all manner of structures has been extremely rapid. It can be summarised under the two headings, pre-stressing and vibration. The excellent paper given to the Southern Association of Gas Engineers and Managers by Mr. E. O. Rose and Mr. W. T. Gedge entitled 'Forty Years of Reinforced Concrete,' sends one back to that of the great French engineer, M. Eugène Freyssinet, presented to a joint meeting of the Société des Ingènieurs Civils de France (British Section) and the Institute of Civil Engineers as long ago as November, 1949, but only recently circulated. M. Freyssinet dealt with the theory of pre-stressing at great length and in a vivacious and masterly manner, but Messrs. Rose and Gedge presented the pith of the matter in a row of simple diagrams which will save the non-specialist some headaches. The attempt to summarise it still further is attended with some risk. Imagine a beam carrying a load between two end supports. The top fibres will be in compression, the bottom in tension. If you apply sufficient compression from an outside source to the bottom fibres you can so re-arrange the stresses that the whole of the beam is in compression from a maximum in the top to zero in the bottom fibres. The practicability of this procedure depends upon the properties of high tensile steel wire of which a length of 50 ft. stressed to 120,000 lb. per sq. in. will stretch approximately 2½ in. A concrete section of the same length will shrink roughly 0.20 in. after pre-stressing is established, and after a few months another 0.20 in. is lost because of the creep of the concrete. Thus it is possible to make a permanently pre-stressed concrete member since the extension induced in the wire is far in excess of the losses which must be accepted.

Several methods of the application of this process were given by Messrs. Rose and Gedge; more will be found in M. Freyssinet's paper. One of the most important results achieved is the elimination of cracking which in concrete tanks, purifier boxes, and similar structures is a source of danger, not only by reason of leakage itself but by the exposure of steel reinforcement to the corrosive actions of such liquors and gases as are met with in the gasworks. For instance, a reinforced concrete roof to an underground liquor storage tank, over which a series of workshops was built, was constructed at Tottenham in 1911. Signs of subsidence were observed in the 1920's, continuing until 1947 when the superimposed buildings were demolished and an examination was made. Liquor had seeped in through cracks at certain points with the inevitable results. True, it was found that the reinforcement was insufficient at these points and the revised rules of 1938 would provide for stresses in both steel and concrete which would limit the risks of cracks, but only with the expenditure of considerably more material. The details of purifier boxes recently built at Tottenham with those of the lids and holding down bolts are most interesting and instructive. And no doubt these designs will stand the test of time. Freyssinet showed, however, that not only is cracking eliminated by the new method, but if cracking should occur as a consequence of temporary overload the cracks close on removal of this load. He called attention to some curious properties of the pre-stressed structure. At the moment when, by reason of the exaggeration of load, a tensile member ceases to be pre-stressed, the stresses in the concrete become zero and, since the effect of this decompressed concrete is now *nil*, the behaviour of the whole becomes abruptly independent of the extent and form of the area of the section previously compressed. A sharp change of properties occurs; a new form of direct equilibrium is established between the tensile forces produced by the load and the forces set up in the pre-stress tendons. He called this the 'transformation load.' It demands a new conception of the safety factor, the ratio of working stress to the maximum stress supportable without permanent modification of the material, which, although perfectly valid for zones of the pre-stressed structure under compression (which, however, are of minor interest since they have every chance of being strong enough—and increasingly strong with age—in any case), has no meaning when applied to the tensile zones. Here the compressive stress, originally induced by pre-stressing, decreases as the load increases until it becomes zero. This load is a limit. Below it the structure possesses all the properties of the

pre-stressed structure; above it these properties abruptly disappear. It would seem that here we have a measure of the pre-stressing force to be applied. Perhaps one may be so bold as to say that it is remotely like building a steel beam with a camber where the bottom boom is given a certain compression which disappears as the beam straightens out, though the analogy must not be pushed further.

The other development is that in the quality of the concrete itself. 'The strength of concrete increases with its compaction'—a curious word which means that voids must be completely filled. Vibration is the means by which the solid particles are brought to an orderly arrangement with only such voids as can readily and quickly be filled by the hydrates provided by the cement. The application of vibration to concrete in large masses is a problem still to be solved. In the meantime much may be done by careful control of the grading of aggregate and the correct water/cement ratio.

FUEL PROBLEMS IN THE OIL REFINERY

THE great oil refinery at Partington, which we visited last year (*Journal* of May 25, 1949) is one of the first instalments in Great Britain of the recent development in the petroleum industry which is taking place in Europe. Readers will remember the discussion last year by Messrs. Walker and Applebee of the use which is being made of tail gases for the enrichment of water gas at the Partington works of the Manchester gas undertaking. The development as a whole follows the realisation that it is more economical in transport and manpower, particularly, to refine crude petroleum within the industrial areas where the refined products are used than to carry out these operations at the well-heads, situated as these often are far from the industrially developed areas of the world. Messrs. Bonwith and Charlton discussed in a paper presented to the Institute of Fuel last month the fuel, heat, and power problems involved in the process, and while these problems have no exact parallel in the gas industry, their discussion cannot fail to be of interest to every fuel technologist.

The raw material of the process at Partington is petroleum naphtha and a very wide range of temperatures is required in the distillation processes, from refrigeration at about—100°C. to upwards of 400°C. Steam is used as the heating medium wherever possible. Exhaust steam at 20 lb. per sq. in. covers a number of the processes and all the space heating of offices, workshops, laboratories, and other buildings. The next upward range is covered by steam at 150 lb. per sq. in. (185°C.) which not only meets a number of process heat requirements but also suits the standard steam pump and similar equipment. Steam is generated in boilers at 600 lb. per sq. in. (250°C.) and serves for power generation and the highest range of steam-heated processes. Above that to 375°C. hot oil is used, and beyond that again direct-fired furnaces are used

Naturally the fuel chosen is oil. Fuel oil is a by-product of the process ,and though the choice between coal and oil had to be taken some years before the plant could be in operation and at a time when the equivalent fuel cost of oil was well above that of coal, it was expected that the difference would decrease (at the moment it is a little in favour of oil) and it is thought that probably in the future the increased petroleum refining capacity in this country will tend to stabilise the price of fuel oil at a relatively low level. The obvious disadvantages of the use of coal also militated against its adoption; the considerabie sidings area which would have been required, the coal-handling and pulverising plant, and that for the collection and disposal of ash and dust proved to be much more expensive than oil storage and pumping, besides ruling out the possibility of having a centrally disposed power station with its economies of steam transmission.

HEAT AND POWER SYSTEMS

THREE main systems of heat and power, were discussed. The choice fell on back-pressure turbines working between 600 and 150 lb. per sq. in. generating 2,000 kW, followed by steam engines and pumps developing another 2,000 H.P and exhausting at 20 lb. per sq. in. Among the reasons for the selection of this scheme were that with plant answering to varying demands steam driving is preferable to electric because of the greater ease with which speed can be controlled, and then steam driving is preferable where there is risk of fire from inflammable vapours. The scheme involved the consumption of more fuel than those rejected, but it necessitates the purchase of less power. Flexibility is increased by the use of a number of steam and electrically driven duplicate fans, pumps, and compressors and by large heat storage tanks. Experience has shown that the steam and power requirements of the processes alter in approximately the same proportion and thus a good balance can be maintained over long periods and over wide ranges of plant capacity. The heat-flow diagram of the whole plant shows that as much as 83.37% of the heat in the fuel is utilised so that even if the perfect balance is not always maintained the efficiency of power generation will still be very high indeed.

Many of the details of design and construction are of great interest. For instance, the three oil-fired water-tube boilers each rated at the maximum of 56,000 lb. per hr. are erected, as not unusual in the petroleum industry, in the open, only the boiler fronts and control instruments being under cover. It is considered that the cost of the necessary lagging of boilers and connections is much less than that of a complete building. Each boiler is so equipped that gas and oil can be burnt either separately or together. The combustion chambers are surrounded on three sides and on the roof by steam-raising tubes and, with a low gas exit temperature, radiation losses are very small. Boiler efficiency based on the net calorific value of the fuel is over 90%. The steam turbines run at 6,000 r.p.m. and drive 3,300 volt alternators at 1,500 r.p.m. through reduction gears. One would have thought that all of the 1,000 electric motors installed would have been of the flame-proof type. Two-thirds of them are, but because of the long delivery times for flame-proof switch-gear, remote control starters of standard design were installed in sub-stations operated by flame-proof push-buttons at the motors with the advantage, among others, that servicing can be done at any time without risk, as well as cross

connections for temporary or emergency requirements.

The treatment of the boiler feed water is described at length. The whole of the condensate is collected and de-oiled where necessary (that from the 150 lb. steam is free from oil) in a complicated but completely successful chemico-electrolytic process assisted by the purity of the Manchester Corporation water supply from which the make-up is drawn. 'Calgon' fed to the boiler prevents residual hardness and the formation of hard scale while practically all the heat content of the continuous blow-down water is recovered. Residual heat from the high temperature oil-fired processes is recovered in waste-heat boilers.

In the gas separation plant, which requires six compressors of about 500 H.P. each, it is interesting to note that slow-running horizontal machines were preferred to the high-speed vertical types because of their higher thermodynamic efficiency. Another advantage of the horizontal type of machine is that the gas cylinder can be in tandem with the steam cylinder, thus giving a higher mechanical efficiency.

The paper will be found well worth reading in full. We have selected above just a few of the points which may be of interest to those engaged in the design of some of the larger gas-making installations which are now under consideration.

MECHANICAL HANDLING

FEW developments in industry during recent years have been more marked than the rapid increase in the use of labour-aiding equipment. For the employer the considerable initial outlay has been balanced by greater rapidity of working and, ultimately, a saving in production costs. For the worker, the decrease in employment has been offset by the elimination of arduous and unnecessary effort, resulting in improved working conditions. The advantages to be obtained by improved methods of mechanical handling were effectively stressed in the report of the Materials Handling Productivity Team that recently returned from America. Among its recommendations were: Close study of handling methods in other industries; a closer examination by each undertaking of its handling arrangements, culminating in the appointment of someone with responsibility to improve them where necessary; the establishment of liaison between British professional bodies and specialist associations and the Handling Division of the American Society of Mechanical Engineers; and more attention to be given to the matter at British universities and colleges.

The subject is of no little interest to the gas industry, which has benefited as much as most from the progress of mechanical handling equipment, and it is particularly topical in view of the exhibition now open at Olympia. This Mechanical Handling Exhibition and Convention is more than twice as large as the first very successful exhibition held in London in 1948 and includes many types of equipment never before displayed. Machinery for coal and coke handling is particularly prominent. In this issue of the *Gas Journal* we publish a detailed review of the exhibits at Olympia. The exhibition opened yesterday and will continue till June 17.

Letters to the Editor

GAS QUALITY

DEAR SIR,—Mr. Leslie Minchin, in his paper, 'Gas Quality and Appliance Performance' (*Journal* of March 15 and 29, 1950), said 'Britain had not a great deal to be proud of in the gas quality situation as it existed before nationalisation.' That criticism cannot be allowed to pass without comment.

For many years the South Metropolitan Gas Company supplied gas of constant chemical and physical characteristics, and gas appliances capable of giving reproducible results year in and year out without requiring adjustment of any kind after the apparatus had been passed as complying with the Company's standard requirements.

For considerably more than a quarter of a century complaints that could be attributed to gas quality were unknown.

It is true that some small modification in calorific value was made in that period, but the specific gravity of the gas did not vary to any appreciable extent.

I have before me as I write a printed brochure entitled 'The Chemical and Physical Departments of the South Metropolitan Gas Company,' produced in 1919. It contains a detailed description of the policy and practice of the Company in the matter of gas quality and standardisation of gas consuming appliances.

I cannot do better than quote from its pages.

The opening paragraph states: 'The purpose of the chemical and physical departments of the Company, however imperfectly it may have attained its ideal, is the application of science to the gas industry.' That declaration of purpose is followed by the statement 'The basic principle of the Company's policy is the manufacture and supply of gas of constant chemical and physical characteristics, and to supply at constant pressure. Such gas is consumed in appliances with fixed gas and air supplies. No adjustment other than by a tap is possible—indeed it is not required.'

The brochure continues: 'In the attempt to achieve the high ideal set by the Company in the matter of the production and utilisation of gas, various control and research departments have been organised. These include: (1) A chemical laboratory with separate sections directed to control and research operations; and (2) a physical laboratory embracing control and research sections together with a burner shop for the manufacture and assemblage in bulk of appliances for use on the Company's district, the apparatus embodying the latest results of research work.'

There follows a detailed description of the work of the departments, 'the primary purpose of which is to ensure that consumers of gas within the Company's area are supplied with gas of constant quality and appliances enabling them to use gas with efficiency and safety.'

There is much more in the brochure that is of interest to gas technologists, but the passages quoted must suffice to show that Mr. Leslie Minchin's criticism is not entirely justified.

It may, of course, be said that had present-day conditions prevailed when Dr. Charles Carpenter framed his policy it would not have been possible to carry it out so successfully, but those of us whose duty it was to put it into practice under his direction were faced with practical difficulties and problems not so very different from those experienced now.

The passage of time may have effaced from memory the circumstances surrounding the origin and introduction of the gas therm. The facts are worth recalling. The story begins when the first world war was being fought out on the battlefields of France and Flanders. In the words of the preface to an official publication of the Fuel Research Board on 'Gas Standards,' 'during the war the extraction of products for the manufacture of explosives, the scarcity of coal and its poor quality led to a marked fall in the heating quality of the gas supplied to consumers; the gas supplied was a mixture which contained a high proportion of nitrogen and other incombustible constituents. These technically called "inerts" merely diluted the gas and were of no value to the householder for heating purposes.'

It was in 1916 that Dr. Carpenter called attention to the 'Sugar Sanding Impulse,' as he described it and which he said 'was certain to cause untold harm to the gas industry' if allowed to persist. Sir George Beilby, Chairman of the Fuel Research Board at that time, with whom Dr. Carpenter frequently conferred, agreed that the insidious evil must be arrested as soon as possible and in 1917 the Fuel Research Board were asked by the Board of Trade and other Depart-

ments concerned 'to advise as to the future policy in regard to gas standards.'

In their report the proposal was made that a system of charging the consumer for the 'potential thermal units supplied to him' should be adopted, and this was accepted by the Board of Trade. Thus it came about that by virtue of the 1920 Act, although the meter continues to record the consumption of so many cubic feet of gas, what the consumer actually pays for is the amount of heat provided by that quantity of gas.

The effect of the 1920 Act was to protect not only the user but the supplier of gas who, as Dr. Carpenter pointed out, often 'stretched his gas to comply with the prodding of his board of directors to make as much as his neighbour who was probably running his exhauster faster.'

The introduction of the therm aroused a storm of opposition, much of it from the gas industry itself.

Before long, however, sanity and good sense prevailed. 'Mr. Therm' appeared on 'buses, on hoardings, and in the daily Press, and all traces of prejudice faded away. 'Mr. Therm' became the friendliest of friends.

That little bit of history indicates that there were difficulties and tough problems to be dealt with in bygone days. Perhaps there is a moral in it for us whose duty it is to provide gas that will give reproducible results in daily service and with the highest practical efficiency.

Is it unreasonable to expect that the reasonable recommendations made in the Report of the Committee of Enquiry presented by the Minister of Fuel and Power to Parliament in 1945 should be complied with in the matter of gas quality?

DEAN CHANDLER.

14, Calais Gate,
Myatts Park, S.E.5.
June 1, 1950.

OPERATION EFFLUENT

DEAR SIR,—The question which Mr. Wedgwood has addressed to me, via Felixstowe and Bolt Court, has already been answered in your columns by Mr. Britton, and there is no need for me to add anything to Mr. Britton's remarks.

I should like, however, to point out that the figures of Mezger and Payer, which Mr. Wedgwood quoted in his paper (*Journal*, May 17, p. 457), have long been known to be quite worthless. Mezger and Payer obtained their results by circulating air through 20 ml. of an aqueous solution of ammonia and carbon dioxide until a volume of 4 litres was saturated with the vapours. The mass of the volatile constituents evaporated would be enough to alter the constitution of the solution very substantially but the determined vapour pressures seem to have been related to the initial and not to the final composition of the solutions. This fault in technique was pointed out by S. Pexton, L. Silver, and myself (J.S.C.I., 1938, **57**, 106) in a paper in which the earlier results of Hollings and Pexton were revised and extended to cover a wide range of liquors likely to be found in washers and condensers. The vapour pressures of NH_3, CO_2 and H_2S were determined at 20° C., 30° C., and 40° C., and the measurements were later extended to 90° C. in order to obtain data for the calculation of the efficiencies of ammonia stills (Badger and Wilson, J.S.C.I., 1947, **66**, 84). All our results have been subjected to a most thorough independent scrutiny by D. W. van Krevelen and two of his colleagues from the Dutch State Mines and they have reported very good agreement both with their own experimental results and with values calculated from the composition of the solutions (*Rec. des Trav. Chim. des Paysbas*, 1949, **68**, 191).

We did not extend our observations to solutions containing a greater weight ratio of CO_2: NH_3 than 2.2-2.3 because the equilibrium vapour pressure of CO_2 rises very rapidly as the solutions become highly carbonated. Thus even at 20° C. the vapour pressure of CO_2 in equilibrium with a solution containing 1.7% NH_3 and 3.9% CO_2 (CO_2: NH_3 = 2.3) is as high as 15% by volume. I cannot therefore give any figures comparable to the first two quoted by Mr. Wedgwood, but I have interpolated from our determinations at 20° C. and 40° C. for the rest of the range.

Solutions containing 2% NH_3 at 25° C.

Ratio CO_2: NH_3 by weight	Ammonia in gas grains/100 cu.ft. of space
2.2	23
2.0	41
1.8	67
1.6	99
1.4	139
1.3	162
1.2	188
1.0	257
0.8	330
0.6	410

The units 'grains per 100 cu.ft. of space' perhaps need some explanation. If a solution containing ammonia is held in a closed vessel at a steady temperature, ammonia will evaporate until its partial pressure reaches the equilibrium value. If some inert gas is pumped into the vessel, the vapour pressure of the ammonia will be unaffected but the concentration expressed as the weight of ammonia per unit volume of gas, measured under standard conditions, will be altered. In order to make the results independent of the partial pressure of the carrier gas they should be expressed as the weight of ammonia per unit of space occupied by the gas under the conditions of measurement.

These figures relate to aqueous solutions containing only ammonia and carbon dioxide. The vapour pressures are affected by the presence of hydrogen sulphide, and of ammonium chloride, in a manner which was discussed in the 1938 paper.

I hope that these figures will have made it clear that Mr. Wedgwood has overstated his case against weak liquor washing by quoting Mezger and Payer.

Yours faithfully,

E. H. M. BADGER.

No. 1 Laboratory,
North Thames Gas Board,
Kings Road,
Fulham, S.W.6.
June 2, 1950.

'OBSTANTA DISCINDO'

DEAR SIR,—Of your courtesy, please grant me sufficient space to reply to Mr. Britton's letter in last week's *Journal*. I am well satisfied with the progress of the campaign which for want of a better title I have called 'Operation Effluent.' Two objectives have been gained now that I have drawn the fire of the Hinckley batteries. I prefer to overlook the fact that Britton still uses old fashioned weapons. I have no desire to use any other weapon than the whole truth. I have not any permanently fixed ideas on any subject. When I reach a conclusion it will be based on what I consider to be completely satisfactory evidence. In this matter Mr. Britton should have everything in his favour because he has had for so long one of the very few hot gas detarrers. I regret that, although I have had experience under very exacting people on 17 gasworks and am familiar with many more, I have not yet come across a hot gas detarrer. That in itself may be significant. Of course I know there is one at Hinckley. Where are the others? Again the answer may be significant. The principles on which this faith is founded have been preached for more than 20 years. Either the message is not sufficiently attractive to the audience, or it has not been put over properly, or gas engineers when congregated together are deaf. I cannot think the latter alternative is correct. I know I am not deaf and I am willing to be converted, but I wonder if Mr. Britton has read the 8th Chapter of Acts in recent times.

This part of the campaign was planned under Code Reference O.D.2. I do not need any reminding of the claims made for hot gas detarring. I have studied them all in original reports and the numerous papers and abstracts in which they have been copied faithfully or in slightly mutilated form. I was careful to use in this connection the Scottish legal phrase 'Not Proven.' Sales talk will not convince me. I want scientific proof. For example, I want to know which of the tar acids are objectionable and in what concentrations they are present in crude liquors and spent liquors with and without hot gas detarring, and in what concentration they are present in the treated sewage effluents. Will Mr. Britton tell me and all the other people who want to know, to what extent the O/A residue is due to these things, and why, and how he knows it is not present in Hinckley's sewage effluent? He says it is not, so presumably he knows. How is it determined? I am badly in need of that information now.

Mr. Britton is incorrect regarding O/A as a proposed basis of some agreements for discharges. He contradicts himself in the next sentence but proceeds to get under cover. I am aware that some agreements have been made on other terms. I do not 'admit' anything regarding O/A and the amount of work to be done at a sewage works. I have been saying it in plain words for years.

My paragraph regarding the test with the cyclone at Coventry and the succeeding one were framed to draw discussion, not only on detarrers, but on sewage treatment with liquor present in the crude sewage. Having had experience with mechanical and electro-detarrers I am well aware of the differences and most of the implications of the results obtained with them. I am still awaiting sound criticism on one point I made. If it is not forthcoming I will try to arrive at the right answer myself in due time. I simply quoted facts reported in Institution Com-

munications. I seek new knowledge—the whole truth—from any quarter. Some amplification of the reported facts might help.

I am delighted that Mr. Britton agrees with me in his next paragraph. I would define a spent liquor of reasonable quality as one produced by distillation of crude liquor which contained the maximum yield of free ammonia in the minimum volume of liquor without an excessive amount of oxygen in the gas treated. I will be reasonable and say that we should get down to 0.2% of oxygen in the gas, but 0.3% would satisfy me. By the way, that 1931 liquor was pretty shocking!

When we come to sewage works we are on entirely different ground both scientifically and otherwise. There seems to be more variation in ideas about the capacity of sewage works than the working capacity of any other kind of process plant I know. Hence some of our disposal problems. But will Mr. Britton tell us what are the unknown factors and how it is decided that discharges of some trade wastes are excessive? I think there is at present too much talk about too little factual knowledge, and that we must try to avoid. Until we know more I think we must be careful not to draw any definite conclusions which may prove to be incorrect. It should be made clear that I am considering these problems, not separately but only as parts of a big subject which requires further investigation.

I mentioned the elementary practical point regarding the production of light tar, or light oil, or tar oil, call it what you will (I support Monkhouse) because some works are handicapped in respect of storage facilities. Sometimes a small point may be important, and the presence of tar in sewage is serious. I have tripped occasionally over an elementary point but I have been fortunate so far in that having learned the lesson I earned forgiveness.

Finally, I am pleased to see published over Mr. Britton's signature a statement to the effect that Hinckley works discharges to the sewers all the liquor produced 'with the exception of two or three gallons per ton from the retort house circulating system.' I referred to the analysis in Badger's Survey and asked my question with the sole object of getting that into print. You see, other people are considering hot gas detarrers and they should have at hand full information. Not everybody is in a position to do what is done at Hinckley with the worst liquor they have to get rid of. Perhaps Mr. Badger and others will wish now to add a fifth item to his list on page 16, of the steps taken at Hinckley to improve the quality of the spent liquor discharged to the sewers. Furthermore, until I read Mr. Britton's letter, I was not aware that hot gas detarring could be expected to reduce the concentrations of thiocyanate and thiosulphate, unless it is because it is not a good thing to pull in air on the inlet of the tar extractor for another reason.

Is that figure of two to three gallons a measured quantity or a reasonable estimate—and please may we all have for our files an analysis of this circulating liquor? It will be interesting and very useful. Any further information we can collect on this subject will be useful.

Mr. Britton hits hard, so I have not pulled my punches very much. I would like to say that I am prepared to meet anybody else on his own ground either to discuss, argue, or fight, if necessary, to get the data we need to put this business of effluent disposal on a sound basis. He and I will meet again, but before then would he check up on his two 'finalists'? I have not a reference book here in my garden. I know the P.L.A. is very interested in O/A's. Since I am still inclined to be provocative I would point out that these recommendations of the Royal Commission were based on work done over 40 years ago, and I even find the title of the Ministry of Health's booklet on the subject (1929) of peculiar interest—Methods of Chemical Analysis *as applied* to Sewage and Sewage Effluents.' I am in complete agreement with Mr. Britton's closing sentence.

May I mention also in this letter another point. You, Sir, used the word 'censure' in your Editorial. Is it not rather a hard word to use in that connection? I would not 'censure' Dr. Key, who probably knows more about this subject than anybody.

While writing I would also like to offer hearty congratulations to Mr. Richardson on his Paper entitled 'Condensates from Oxide Boxes' in this same issue of the *Journal*. In my opinion it is the most useful article on oxide purification we have had before us for many years, and as regards effluent problems it goes right to the point. I notice that the oxygen content of the gas is high in every case quoted. Could he supplement his data with information about HCN recovery mainly in the form of prussian blue, which is a useful product, for which I believe a relatively low concentration of oxygen in the gas is desirable? Was the oxygen tested on the inlet or the outlet of the purifiers in these cases?

I notice that he is wondering, as I am, where the 'rule' about ammonia for purification originated. It has been copied and recopied for a very long time. Was somebody making a virtue of necessity, because 4 or 5 grains per 100 cu.ft. of ammonia in the gas entering the purifiers represented the limit of the scrubbing efficiency of some of the washing plant in those days?

Yours faithfully,
PHILIP WEDGWOOD.

18, Watford Road,
St. Albans, Herts.
May 29, 1950.

Diary

June 10.—Scottish Junior Gas Association (Eastern District): Annual Outing, Galashiels.
June 12.—N.A.L.G.O. Gas Members: Conference, Eastbourne, 9.30 a.m.
June 14.—Southern Gas Consultative Council: Grand Hotel, Fir Vale Road, Bournemouth, 11 a.m.
June 14.—Manchester District Junior Association of Gas Engineers: Ladies' Day. Visit to the works of the Derbyshire Silica Fire Brick Company.
June 15.—Midland Junior Gas Association: Ladies' Day.
June 27.—Southern Association of Gas Engineers and Managers: Summer Meeting, Cambridge.

The Second National Mechanical Handling Exhibition, which opened yesterday at Olympia, will continue until June 17.

100 YEARS AGO

Boston Tea Party

Life a century ago, it seems, positively sparkled with new inventions—all, be it noted, for the betterment rather than the elimination of, mankind. The remarkable scene illustrated below shows the fruit of experiments 'conducted upon the most philosophical principles' by one Henry M. Paine, of Boston, U.S.A. The *Journal* of June 10, 1850, reports how his 'Magneto-electric Decomposer' was demonstrated before

Line drawing by G. W. Battison

a number of gentlemen at his residence. When a small jet of pure hydrogen between two semi-circular plates of iron, raised a few inches from the floor, was lighted, not only was the room brilliantly lit but 'an equal and genial heat was diffused throughout the apartment.' Thus the astonished party, after closely examining the flame and the cellar below where the gas was made in a small machine 18 in. square and 8 in. in depth, was loud in its praise. Our report mentioned that a larger machine recently perfected by Mr. Paine, and occupying a space 3 ft. square by 6 ft. high, set up in Worcester Exchange, was of sufficient power to supply 3,000 burners with gas.

Personal

Mr. **R. H. Bone** has been appointed a Commercial and Sales Officer by the Scottish Gas Board. He is at present Sales Manager of the Cardiff undertaking.

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Mr. **Norman Kirkup,** Stockport Road, Manchester, who has represented David Grant & Co., Ltd., Edinburgh, for 15 years in the North of England, severed his association with the Company on May 31.

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Mr. **Harry C. Jackson,** Sales Superintendent to the Stretford undertaking of the North Western Gas Board, and immediate Past Chairman of the Salesmen's Circle, has been elected President of the Rotary Club of Urmston.

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Mr. **Leslie Graham,** Marketing Director of the Northern (N. & C.) Division of the National Coal Board, has been appointed to succeed Mr. R. W. Parker as Deputy Chairman of the Division on July 1.

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Mr. **T. H. Prater,** Joint Manager of the Margate undertaking, has been awarded the bronze medal of the National Society for Protection of Life from Fire in recognition of the part he played in rescuing a family from a blazing house at Margate last August.

◇ ◇ ◇

Mr. **B. P. Bezant,** Station Engineer of the Sevenoaks and Tonbridge undertakings, Kent Suburban Division, South Eastern Gas Board, has been elected Chairman of the Tonbridge Urban District Council. Mr. Bezant, whose father was for many years Editor of the *Gas Journal*, is a Director of Walter King, Ltd.

◇ ◇ ◇

Mr. **G. R. Bullwinkle** has retired from the position of Station Engineer of the Vauxhall Works, Metropolitan Division, South Eastern Gas Board, after 42 years' service in the gas industry. From 1908 until 1932 he was with the Commercial Gas Company, and in the latter year he was appointed by the late Dr. Charles Carpenter as Engineer of the Vauxhall works of the then South Metropolitan Gas Company.

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Mr. **C. Pinkham,** Manager of the publicity organisation of the General Electric Co., Ltd., is retiring on June 30 after serving for 37 years with the Company. He joined the G.E.C. in October, 1913, and in 1920, on his return from the war, was appointed Manager of the stock rooms. In 1924 he was transferred to the order department as Manager, and in 1927 he was appointed Manager of the publicity organisation, in which capacity he has been responsible for the entire range of G.E.C. publicity. He has been a member of the Council of the Advertising Association for 14 years.

◇ ◇ ◇

Mr. **William A. King** retired on May 27 from the post of Chief Clerk at Arbroath gasworks after 40 years' service. He was for many years a member of the council of the North Eastern District of the Scottish Gas Salesman's Circle, and was latterly Secretary. For four years he has been Scottish representative on the National Council of the British Gas Staff Association. Mr. King was teacher of commercial subjects at Arbroath High School evening classes for 24 years. To mark his retirement he was presented with a gift by Mr. C. W. Dalton, Arbroath District Manager, Scottish Gas Board, on behalf of the gasworks employees.

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Mr. **R. B. Reynolds** has joined the sales staff of George Wilson Gas Meters, Ltd. Mr. Reynolds had previous service with the Company from 1936 to 1938, when he received training in all departments of the firm. During this time he attended the Coventry Technical College and passed the first two years' course of the Institution of Gas Engineers. Subsequently, he became Technical Assistant to Stockport Gas Department and completed the third year course at the Stockport Technical College. In 1940 he joined the Forces and was commissioned in the Royal Engineers, returning to the industry in 1946. Mr. Reynolds will take over Mr. **G. C. Ball's** duties in the Manchester area, as Mr. Ball is returning to Coventry, and he will also work in collaboration with Mr. **R. S. Pound,** who represents the firm's interests in the North East.

Mr. **J. S. Pritchard,** Managing Director, and Mr. **L. M. Copeland,** A.C.A., Financial Director of J. S. Pritchard, Ltd., have been appointed Joint Managing Directors of Clifford Products, Ltd., Gas Appliance Manufacturers, who have acquired J. S. Pritchard, Ltd., Gas Appliance Distributors. Mr. Pritchard continues as Managing Director of J. S. Pritchard, Ltd. Mr. **J. R. W. Alexander** has joined the Board of both Companies.

◇ ◇ ◇

Mr. **Harry Sale,** District Manager at Chatteris, Cambs., has been appointed to a similar position at Beccles, Suffolk, and commences his new duties on July 1. He was Manager at Brandon, Suffolk, when he obtained his appointment at Chatteris in 1937, and since he went there the gas consumption has risen from 13 mill. to over 35½ mill. cu.ft., with the number of consumers almost doubled and considerable extensions and improvements to the gasworks.

1950 'Journal' Directory

The following changes have been notified during the past month. To keep the information of the 1950 edition of the *Gas Journal Calendar and Directory* up to date readers are advised to note these alterations (together with the appropriate adjustments relating thereto in the 'Personnel' section, pp. 135-148a):—

Page 21.—EASTERN GAS CONSULTATIVE COUNCIL: Delete Councillor W. J. Bailey (Chelmsford), *member.*

„ 31.—NORTHAMPTON SUB-DIVISION: J. Corrigan, *Sub-Divisional Manager,* vice C. C. Wood.

„ 48.—LEEDS GROUP: Calverley & Horsforth, Yeadon & Guisley: J. D. Baxendale, *Dist. E & M,* vice J. E. Holliday.

„ 53.—NORTH THAMES GAS BOARD: Add T. V. Garrud, *Deputy Commercial Manager.*

„ 35.—EASTERN GAS BOARD: Add F. J. Martin, *Assistant Secretary.*

„ 30-31.—ASHBY-DE-LA-ZOUCH, SHEPSHED: Delete J. E. Matlock, *M,* retired.

„ 81.—SOUTH WESTERN GAS BOARD: W. L. Wright, *Deputy Coal, Coke & Transport Officer,* becomes *Coal, Coke & Transport Officer,* vice J. Thornhill, deceased. Add E. Attenborough, *Publicity Officer.*

„ 100.—FESTINIOG GROUP: Delete.

„ 101.—PONTYPOOL: *Address,* Hanbury Road, Pontypool. T/N 506-7.

„ 103.—LAMPETER: Add W. M. Young, *E & M.*

„ 104.—FESTINIOG GROUP: Delete.

„ 105.—LLANILOES: E. Williams, *E & M,* vice G. Jones.

„ 105.—CAERNARVONSHIRE GROUP: Add Festiniog, Port Madoc, and Pwllheli undertakings (details as under Festiniog Group, p. 104).

„ 105.—LLANBERIS: Add J. Lucas, *E & M.*

„ 106.—BEAUMARIS: Add J. Willmot, *E & M.*

„ 107.—WREXHAM GROUP: Add Bala undertaking (details as under Festiniog Group, p. 104), and Corwen undertaking (details as under Flint Group, p. 107).

„ 105.—BRECON AND RADNOR GROUP: *Convener,* C. B. Felton, Gas Works Llandrindod Wells, Llandrindod, T/N 2342, vice R. T. Prescott.

„ 109.—WEST MIDLANDS GAS BOARD: Add Dr. F. H. Tyrer, M.R.C.S., L.R.C.P., *Industrial Medical Officer.*

„ 110.—NORTH STAFFORDSHIRE DIVISION: Add E. N. Farnworth, *Divisional Engineer.*

„ 110.—NEWCASTLE-UNDER-LYME: Delete E. N. Farnworth, *E & M.*

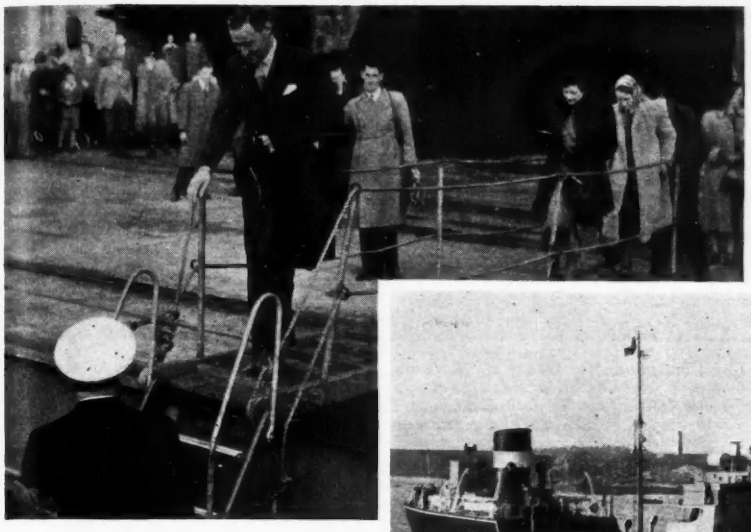
„ 114.—SHIFNAL DISTRICT: C. H. Woodfine, *E & M,* vice B. Rowlson.

„ 119.—GRANGEMOUTH: Add G. C. Wood, *M.*

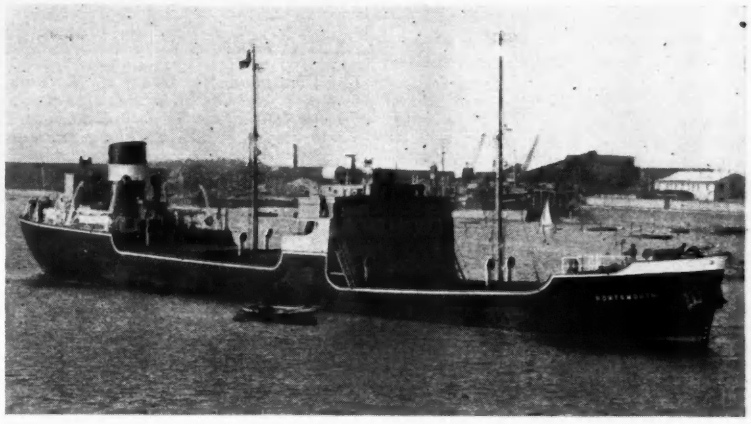
„ 128.—AUCHINLECK: W. Forsyth, *M,* vice H. Devine.

„ 149 & A7.—GAS CHAMBERS AND COKE OVENS, LTD.: Chandos House, Buckingham Gate, London, S.W.1, T/N Abbey 6912.

MAIDEN VOYAGE OF THE 'PORTSMOUTH'



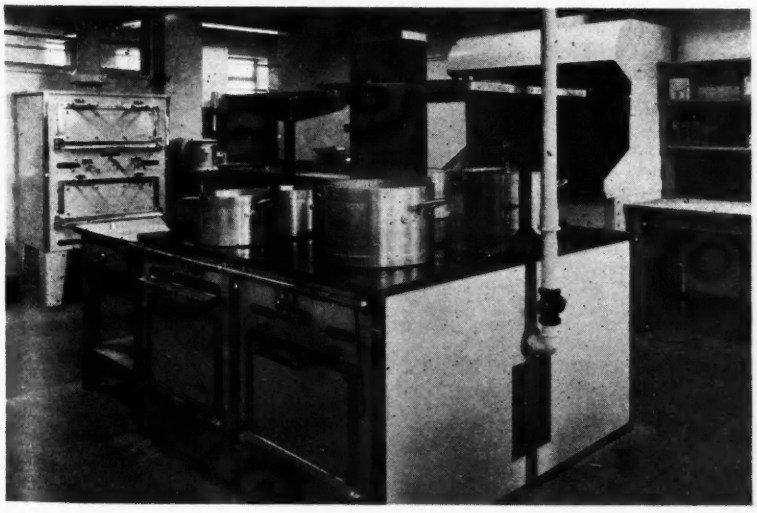
THE new motor vessel *Portsmouth*, launched on February 17 by Mrs. W. K. Tate, wife of the General Manager, Eastern Division, Southern Gas Board, arrived at the Flathouse gasworks quay on her maiden voyage from the east coast on May 26, carrying 2,467 tons of coal for the Southern Gas Board. She was welcomed at the quay by the Chairman and Deputy Chairman of the Board, Directors of Stephenson Clarke, Ltd., and chief officials of the Board.



Above: *Mr. O. R. Guard, Chairman, followed by Mrs. Guard and Mr. and Mrs. Tate, going aboard to welcome the Captain.*

Right: *The* Portsmouth *approaching the quay, as seen from one of the new coal unloading cranes installed thereon.*

Modern Cambridge School Kitchen



The first new school to be opened at Cambridge since the war, the Fawcett School at Trumpington, has been installed with gas-operated kitchen equipment. To enable the serving of 380 meals in two sittings the following appliances have been supplied by Radiation, Ltd.: A three-oven Chester range with Regulo control (shown in the photograph above); 30-gal. Lune vegetable boilers with counter-balanced cover lids and water swivel arms; a 30-gal. milk and porridge boiler; Keswick vegetable and pudding steamers; a No. 3324 roasting and baking oven on stand; gas-heated sterilising sinks; and a 6-ft. Belgravia minor hot closet.

Freedom of Choice.—Scunthorpe Housing Committee has decided that every new council house to be built shall be fitted with both gas and electricity points. The Town Council is applying for housing loans to a total of £516,732.

Coal Output.—Total production of coal during the week ended May 27 fell from 4,546,100 tons in the previous week to 4,351,100 tons. In the week ended May 20 there was a further loss of 200 men, reducing the total number on colliery books to 700,300. A reduction of 400 in the number of workers at the face was also recorded. Gas available at gasworks during the week ended May 21 totalled 9,797.4 mill. cu.ft., against 9,797.4 mill. in the week before. Electricity sent out for public supply amounted to 892.7 mill. units, against 903 mill., over the same period.

Change of Address.—Headquarters of the Department of Scientific and Industrial Research have been transferred from Dorland House and Rex House, Regent Street, S.W.1, to Charles House, 5-11, Regent Street, S.W.1. The telephone number remains Whitehall 9788. For the time being headquarters of the Hydraulics Research Organisation (Sir Claude Inglis) and the Mechanical Engineering Research Organisation (Dr. G. A. Hankins) will remain in Rex House, Regent Street, S.W.1. The new telephone number of these organisations will be Whitehall 1952.

Midland District Education Committee

Mr. H. R. Hems, Chairman of the Midland District Education Committee, reports that as the various education courses available to students in the industry, run reasonably smoothly it has only been necessary to hold two meetings during the year.

The Committee consists of nominated representatives from the Midland Association of Gas Engineers and Managers and the Midland Junior Gas Association, in co-operation with H.M. Inspector of Education and the Principal of the City of Birmingham Technical College, and at one meeting the Principal of the Derby Technical College was represented.

The valuable collaboration of these gentlemen is greatly appreciated and Mr. Hems specially refers to the work done by Mr. E. T. Pickering as Secretary.

The primary job of the Committee is giving advice and help to students and prospective students, and other matters dealt with have been certain aspects of the Associate Membership examination, suggestions from other educational bodies, the preparation of the panel of examiners for the City and Guilds Gas Fitting Classes, nominations for the short course for teachers, and the Institution Education Conference.

The entries for the 1949 examinations were a record and the successes obtained in the Midland Colleges compare favourably with those of the total entry, the Birmingham Technical College tying with one other of the larger colleges.

Two Midland students were awarded the James Archibald Maclay prizes.

The Chairman, Mr. Henry F. H. Jones, M.B.E., M.A., *opens the first area staff conference of the East Midlands Gas Board at the Imperial Cafe, Skegness, on May 11. On his left is the Deputy Chairman, Mr. Sydney Smith, with Mr. Frank Lee, a member of the Board. The conference was reported in the* Journal *of May 24.*

Visit to General Gas Appliances

On May 10 three motor coaches loaded with West Riding Gas Salesmen crossed the Pennines on a visit to the works of General Gas Appliances, Ltd., Audenshaw, Manchester. Before visiting the works they were the guests of the Chairman and Directors of the firm at luncheon in Paulden's Restaurant, Manchester.

At Audenshaw, in the afternoon, the visitors saw every stage of production of the modern gas cooker, from the press shop, through the enamelling shop, on to the fitting and despatch department. Of particular interest to the salesmen was the fitting and testing of the 'Junior General' cooker, for which there has been an exceptional demand since its introduction by the firm some time ago. Altogether the visitors found their tour a most instructive one, and they were very impressed by the modern mechanised production line which results in a high output of appliances.

The party returned to Paulden's Restaurant for tea, where they were welcomed by Mr. H. C. Wilson Bennetts, Chairman and Managing Director, General Gas Appliances, Ltd., who introduced Mr. W. T. Wren, Sales Director, Aga Heat, Ltd., who said that as an exponent of solid fuel he was particularly interested in the gas industry; his firm manufactured a domestic boiler which burned coke.

Mr. R. Howarth, Chairman, West Riding Salesmen's Circle, in thanking the Chairman and Directors of General Gas Appliances, Ltd., for the facilities and for the hospitality extended to the Circle on their visit, said that he hoped they would, as a Circle, continue to maintain the good relations between manufacturer and the public.

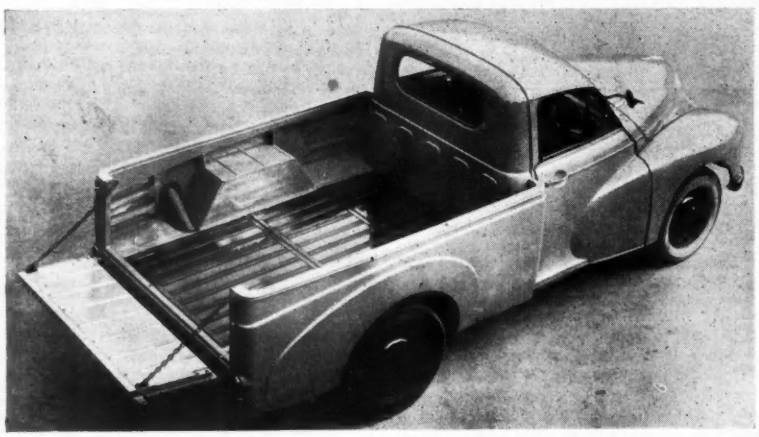
New Light Delivery Van

The new 'Cowley' van of the Nuffield Organisation, shown below, is a stylish addition to the ranks of light delivery vans. Most noticeable features are the all steel body and the bonnet and radiator design which, with wide grille and rounded lines, follows closely present day automobile styling.

The basis of the new van is a strongly made chassis frame, in order that alternative bodies can be made available for different types of work. In addition to the complete van, the vehicle can also be supplied as (a) a truck, (b) chassis and cab with closed back, (c) chassis and cab with open back.

In the case of the complete vehicle, or basic cab equipped chassis, the front end unit becomes part of the general cab or body structure.

The gear change is mounted on the steering column so that the whole of the front floor space is unrestricted. The Lockheed hydraulic brakes are of 9 in. diameter with two leading shoes at the front. The van body has an interior capacity of 120 cu.ft.



North Eastern Gas Board.—The Headquarters Staff recently marked the first anniversary of the nationalisation of the gas industry by holding a birthday party in the canteen at Bridge Street, Leeds. The Social Committee, under the chairmanship of Mr. R. Howarth, arranged an excellent programme for their guests. After tea, at which the birthday cake, complete with one candle, was ceremoniously cut by the Chairman of the Board, Dr. R. S. Edwards, an informal evening of games and dancing was enjoyed. Mr. G. E. Currier, Deputy Chairman, and Mr. A. McDonald, Board Member, were present, as were also the chief officers of the board.

VISIT TO THE BRYAN DONKIN COMPANY

WHEN the Yorkshire Junior Gas Association recently visited the works of the Bryan Donkin Company, Ltd., Chesterfield, some 85 members spent an interesting and enjoyable day, seeing the products of this famous gas engineering firm being manufactured. The fact that the visit was the first the Yorkshire Juniors had ever paid to the works made the occasion a memorable one, and the excellent arrangements of the Directors of the Company for their guests during the visit were greatly appreciated by all.

An Eventful History

An interesting illustrated brochure was presented to the visitors giving the history of the firm, which was established as far back as 1803 at Bermondsey, London, by Bryan Donkin, F.R.S. Bryan Donkin's first work was the perfecting of the Fourdrinier paper machine, which he was the first to manufacture and the first to sell. He thus laid the foundation of a great industry, as previously all paper had been made by hand. He built up a flourishing business, which was carried on by his sons and grandsons until about 1890, when the company confined its energies to the gas industry, which is its chief business today. A search amongst the papers of the company in those early days reveals association with men and undertakings that have since become historical: Telford, Rennie, Bramah, Boulton & Watt, Murdoch, Simpson, Maudslay, John Hall,, Sir William Congreve, the two Brunels, Naysmith, Penn, and others; drawings signed by many of these men are still in the firm's possession.

It was between the years 1840 and 1850 that the company began to devote its attention to the gas industry. In 1847 a special type of valve known as the rack and pinion valve was designed at the suggestion of the Chartered Gas Company, and, although it had many imitators, it is still one of the chief products at the Chesterfield works. Other types of valve were afterwards made for use in different parts of gasworks.

The company also took up the manufacture of gas exhausters, which has since become such an important section of the firm's business, making what was known as the 1847 patent. This was afterwards superseded by the manufacture of patents of John Beale, which have come into use more than any other type in Great Britain. A further patent on this design was taken out by Mr. Thomas Donkin's eldest son, Mr. E. Bryan Donkin, who took a special interest in this class of machine. The company is today well known for the manufacture of the Beale exhauster, and for its three and four blade exhausters.

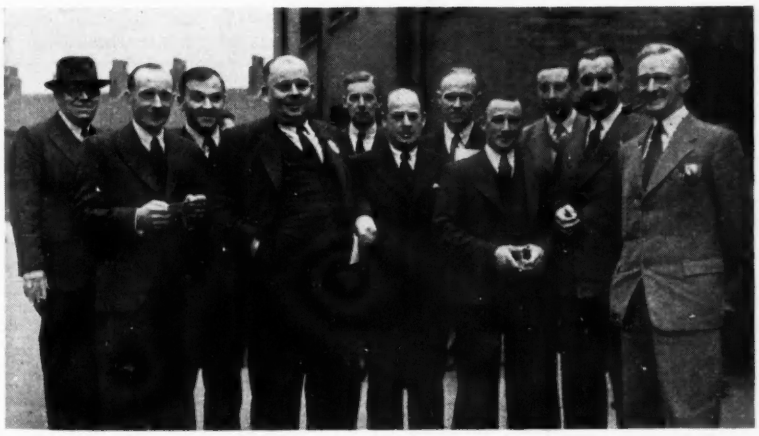
After a century of eventful history in Bermondsey, the growing interests of the concern and the difficulties of transit, and expansion on an adequate scale in Bermondsey, caused the company to seek greater conveniences, and the whole concern was removed to Chesterfield.

Mr. Donkin was succeeded as Chairman and Managing Director by Mr. George Clark, O.B.E., who joined the company in 1893, and had effected the transition of the business from London to Chesterfield. During Mr. Clark's period as Managing Director, from 1908 until his recent retirement in September, 1949, the works were continually extended to cope with the growth in the demand for the various specialities that he introduced and developed, such as district and service governors; high pressure and coke oven type valves. Rateau centrifugal exhausters, boosters and compressors; vertical compressors; Connersville machines, furnace work, &c. The large, well laid out works of the company at Chesterfield now cover some 14 acres.

Mr. Clark is still on the Board of Directors, but has been succeeded as Chairman by Mr. D. M. Henshaw, who is also Chairman of B.H.D. Engineers, Ltd., a holding company of which the Bryan Donkin Co., Ltd., and W. C. Holmes & Co., Ltd., are the two main operating companies. The present Managing Director, Mr. Lewis Seaman, has been with the company 40 years.

The Juniors also had the opportunity of seeing furnaces and equipment made by British Furnaces, Ltd., an associate company of the Bryan Donkin Company, during their works tour.

Mr. George Clark, O.B.E., J.P. (centre), Director of the Bryan Donkin Co., Ltd., photographed with Dr. R. S. Edwards (left), Chairman of the North Eastern Gas Board, and Mr. Lewis Seaman, Managing Director of the Company.



A group of Yorkshire Juniors with their President, Mr. J. Hargreaves (extreme right), at the beginning of their tour. Mr. B. W. Fowler (fourth from the left) is the guide.

The visitors were entertained at lunch in the Odeon Restaurant, where they were welcomed by Mr. Seaman, on behalf of the Chairman and Directors. He was also very pleased to welcome Dr. R. S. Edwards, Chairman of the North Eastern Gas Board.

After completing their tour of the works, the visitors had tea in the canteen, where Mr. J. Hargreaves, President of the Yorkshire Junior Gas Association, thanked the firm for their hospitality.

Tomorrow's Gas Engineers

Mr. G. Clark, Director, the Bryan Donkin Co., Ltd., replying, said that his talking days were over, but it gave him very great pleasure to welcome the Juniors to Chesterfield. The young men of today were the gas engineers of tomorrow. They would have to study hard as they would not only have to be engineers, but chemists as well. He hoped they had all benefited from going round their works.

Dr. R. S. Edwards, Chairman, North Eastern Gas Board, said that the Bryan Donkin Co., Ltd., had a very large part to play in the gas industry's future. 'We can realise after going round their works some of the difficulties involved in stepping up their production to meet our needs,' he concluded.

Mechanical Handling Exhibition

A Wealth of Interest for the Gas Engineer

THE Mechanical Handling Exhibition and Convention which opened at Olympia on June 6 and will continue until June 17, is claimed as the world's largest display of labour-aiding equipment. With a floor area of exceeding 200,000 sq. ft., it will be more than twice as large as the first exhibition, held in 1948.

The following review of exhibits has been compiled as a guide to the gas engineer who will find much of interest at the exhibition.

Stand B.13.—**A.C.E. Machinery, Ltd.,** exhibit the standard A.C.E. intermittent running de-breezing screen with coke weighing and bagging unit, well known to gas undertakings. This is the outcome of years of specialised experience and is capable of delivering 25 tons of clean coke bagged and weighed in one hour. With a continuous running screen it will supply 50 tons of coke per hr. bulk loading. Both screens require only ⅜ H.P. for the drive.

The A.C.E. power and hand transporters possess unique constructional details and are claimed to present the most advanced design in this market. Available from a range of 48 standard units with the prime mover as a petrol or diesel engine or electric motor, they can be controlled from a single lever control post. Also shown is a range of standard electric and diesel driven winches capable of dealing with loads up to 35 cwt.

The electric driven capstan winch as supplied to many gas undertakings have several unique features, including a totally enclosed oil bath gear case. These winches can be made to customer's requirements from 1-5 ton capacities.

Stand F.5.—**Babcock & Wilcox, Ltd.,** feature a working model to illustrate an ash disposal plant associated with a modern boiler house. The A type hopper is water filled to ensure a long life to the refractory linings. The model illustrates pumping 'to fill' or, alternatively, to ash bunkers, also hydro-vac dust disposal to atmospheric bunkers.

A 1-cu. yd. Chaseside loading shovel.

Other models shown include a coal, ash, and dust handling plant operating in conjunction with a power station which contains 300,000 lb. per hour, pulverised fuel-fired high head boilers, and a 3-ton level buffing and travelling jib crane with a maximum radius of 60 ft., hoisting speed of 210 ft. per min., slewing speed of 1¼ revs. per min., and a luffing speed of 200 ft. per min. A single entry centrifugal pump for handling ashes and a paddle type dust mixer conveyor are also exhibited.

Stand H.12.—**Birtley Co., Ltd.,** exhibit a comprehensive range of bulldozer mouldboards, including 4A-44-in. gauge, 6A-60-in. gauge, 7A and 8A; and a composite pictorial display of action and field photographs of Birtley-built earth-moving equipment at work.

Attention is focussed on the fabrication facilities of this concern, which is one of the B.S.A. Group of Companies. Materials handling plant which has a particular application to coke and coal installations is also illustrated.

Stand B.14.—**British Ropes, Ltd.,** in addition to packing cords, canvas tarpaulins, and bright steel bars, exhibit 'Blue Strand' preformed steel wire ropes and 'Viking' nylon rope and slings, sisal transmission ropes, and square plaited driving rope.

Also shown are steel wire ropes for mines, elevators, cranes, hoists and all types of contractors' plant and excavating machinery.

Stand A.29b.—**British Thomson-Houston Co., Ltd.,** exhibit a range of electrical equipment for application to all forms of mechanical handling. A working demonstration of a hoist incorporating 'Stacreep' control is an imposing exhibit, as is the control console for the various electric drives of the world's largest walking dragline which is now being built by Messrs. Ransomes and Napier, Ltd. Other impressive displays comprehend electric motors and control gear for cranes, hoists, conveyors, elevators, &c.; electric motors and control gear for battery-vehicles; gearboxes and geared motor units; a Graiseley battery-electric chassis with a B.T.H. fractional horsepower motor and gearbox; electronic equipments for the rapid and accurate control of various types of machinery; and magnetos for internal combustion engines. A fascinating exhibit, although of only oblique interest to the gas engineer, is an entirely new type of conveyor designed for transporting empty syrup tins which is shown in operation.

Stand A.25.—**British Tyre & Rubber Co., Ltd.,** exhibit a wide range of conveyor belts for almost every class of material—belts for light work such as handling boxes, bales, sacks, paper, &c., and belts for handling the most abrasive and awkward loads, such as heavy ores and jagged lumpy rock, and phosphates and other fertilisers.

For handling hot ashes, hot castings, sinter, hot coke and bricks, and hot corrosives such as hot superphosphates, B.T.R. 'Super Long-Life' belts for hot materials are featured. Belts of non-staining white, and smooth covers for hot materials requiring a smooth finish, such as hot plastics, are also shown.

A Jones KL 44 mobile crane operating a grab with double drum winch.

Stand B.4.—**British Wedge Wire Co., Ltd.,** specialises in the design and manufacture of plant using woven wire belts. This has considerably increased the scope of mechanical handling in processes where the circulation of air and liquids is necessary, or high temperatures prevail. Specimens of numerous types of woven wire belting suitable for a wide variety of applications are displayed, together with photographs covering all the activities of the Company.

Other exhibits include a trolley sack hoist, and small scale working models of a mechanical handling system for cases, a Wedge Wire rotary screen, and a bottom hinged portable slat elevator.

Stand A.4a.—**Chaseside Engineering Co., Ltd.,** exhibit a representative machine from their extensive mechanical shovel range, and in addition, show a 3 cu.yd. dumper, and a 2-ton mobile crane. It should be noted that the firm's range of shovels comprises 14 different types, having scoop capacities of ½, ¾, or 1 cu.yd., together with suitable variations of a basic design to conform to the specific requirement of users in a great many industries. All Chaseside equipment is now available with diesel or petrol engine, while other recent optional improvements and attachments include a gear driven winch, a fully enclosed driver's cab, a brickstacker attachment capable of placing up to 3,000 bricks per hour on to 16 ft. scaffolding, and a new angle-dozer for use with the Chaseside shovel range. In addition to the range of machines and attachments actually exhibited, the Chaseside colour film

shows this equipment engaged on a wide variety of interesting jobs.

Stand A.6.—**George Cohen, Sons & Co., Ltd.,** exhibit two Jones mobile cranes. The KL.44 mobile crane has a maximum lifting capacity of 4 tons at 8 ft. radius, its own diesel engine driving all motions—hoisting, slewing, derricking, and travelling. It is used with 24 ft. channel, or 30 ft., 40 ft., or 50 ft. lattice jibs, and operates with hook, grab, or magnet. Five types of chassis are available: Heavy duty pneumatics with restrictor rings, twin solid rubber tyres, crawler tracks, rail wheels, or lorry mounted (speed 20 m.p.h.). Optional equipment includes electric lighting equipment, mudguard wings, electric starting gear, audible safe load indicator, tyre inflator, and cabin heater.

The KL.15 mobile crane, smallest in the range, has a maximum lifting capacity of 15 cwt. at 7 ft. radius; hoistings, slewing, and travelling are power driven. With a 16 ft. channel jib, the KL.15 is widely used not only for various fetching, carrying, and stacking jobs both indoors and out, but for skip hoisting on trench work, from 12 ft. below ground level.

Stand F.11-12.—**Robert Cort & Son, Ltd.,** exhibit a range of screens covering most, if not all, of the requirements of a modern coke handling and grading plant, the majority being powered to demonstrate their function and operation. Included among them are this firm's latest type 'Super-Spartan' heavy duty balanced reciprocating screening-conveyor, embodying an improved arrangement of overhead drive. In association with this screen is being shown the 'Cæsar' heavy duty single deck oscillating screen, representing a type particularly suitable for scalping purposes.

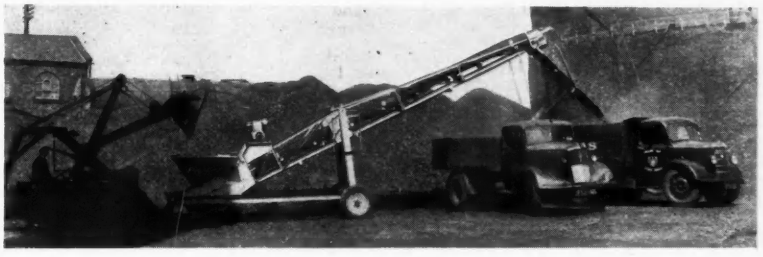
Also exhibited is the 'Spartan' light duty balanced reciprocating screening-conveyor, and 'Reading' debreezing screen, together with one of the firm's largest size double-roll coke cutting machines and a mobile coke cutting and screening unit, the latter being a machine particularly useful in the smaller gas-works.

Various types of valves used in the gas and coking industries are also shown.

great height without burying the road wheels. It can also be employed for charging overhead purifiers and for loading over two and even three sets of railway lines.

The height is adjusted in a few moments by means of power-operated hydraulic jacks and one man only is required to operate the machine, namely, the driver of the mobile shovel which will tow the machine to its job and then feed it. The machine is capable of handling over 80 tons of coal per hour.

Another model shown is the 30 ft. 'Super-mobile' stacker to the end of which is a new screen attachment provided with angular adjustment both for the screen and for the breeze shoot. The parallel bar screen is of special design, making it remarkably free from blockage. Also shown is a 25 ft. package stacker and a 15 ft. bag stacker.



A Chaseside shovel feeding a 30 ft. 'Super-mobile' stacker with fitted screen attachments by Crone & Taylor, Ltd.

Stand H.3.—**Dunlop Rubber Co., Ltd. (General Rubber Goods Division),** exhibit conveyor belting for all purposes, including a special type for use by the food industry where cleanliness is all important. A working scale model of a conveyor belting installation is one of the main exhibits and elevator belting is also shown on the stand.

Facilities for the rubber lining of tanks and pipes are extremely comprehensive. Examples of this type of work are on show, together with scraper rubbers, skirting boards and various types of rubber covered idlers.

The Dunlop range of hoses includes very large bore examples for the oil industry, smaller types for pneumatic tools, &c., and flexible pipes suitable for resisting very high pressures and temperatures. For transmission requirements there is belting of all types—folded, balata, square edge, and V.

Stand B.30.—**Ewart Chainbelt Co., Ltd.,** are exhibiting a complete range of their malleable iron and steel chains for conveying, elevating and driving purposes. This range includes Ewart type, Gray type, and Ley bushed type, with various attachments to suit all applications. They also are exhibiting numerous types of fabricated steel chain and attachments, and a complete series of steel driving chains.

Two working models are shown, one dealing with the handling of bulk material, illustrating elevator, feeder, drag link conveyor and storage hopper; the other is a complete model of a package handling plant. There are various photographs of mechanical handling plants designed, manufactured, and erected by this Company. Spiral conveyors are also in evidence, together with troughing idlers, flat idlers, and a section of gravity idlers, flat idlers, and addition, there are many types of special chains, and chain and trolleys, &c., used for different types of monorail conveyors.

A photograph of the 'Caesar' heavy duty single deck oscillating screen exhibited by Robert Cort & Son, Ltd.

Stand A.31.—**Crone & Taylor, Ltd.,** specialise in stackers of various types. Most impressive is a 40 ft. mammoth stacker. The outstanding feature of this electrically-operated machine is its enormous overhang, enabling it to stack to a

Stand A.15.—**Fraser & Chalmers Engineering Works** display a working model of a 'Marshall' wagon tippler working in conjunction with 'Sherwen' vibrating feeders and conveyors. 'Gyrex' mechanically-operated vibrating screens and component parts of belt conveyors are also on view.

In addition, there is in operation a 'Shenwen' electro-magnetically operated system of conveying and screening, together with a reversible vibrating conveyor and a foundry box shake-out, heavy duty feeder, bunker vibrators, test sieve shakers and a full size screen.

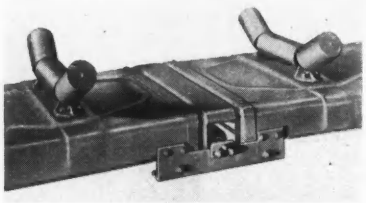
Stand B.39.—**Goodyear Tyre & Rubber Co. (Great Britain), Ltd.,** show a range of endless cord and transmission belting, with the new steel cord belt prominently displayed. Oil suction and discharge hose is exhibited with representative samples of the Goodyear hose range shown both diagrammatically and in sample form.

Conveyor belting and stacker belts are also displayed, with a range showing constructional details. The belting exhibited are samples of those types already in constant use in coal mines, gravel pits, factories and industrial undertakings throughout the country.

Stand F.10.—**International Combustion, Ltd.,** feature a full scale working section of a heavy duty gravity bucket conveyor. The exhibit comprises chains, buckets, sprockets, filler and driving gear,

and the nominal capacity of the conveyor represented by this exhibit is 125 tons of coal per hour. An interesting feature is the fully automatic lubrication of the chain.

The other exhibits include a model of a typical 'Beaumont' drag scraper plant, which emphasises the extreme simplicity of this type of plant, a short section of conveyor with examples of oil-filled and ball bearing idlers, 'Syntron' feeders and vibrators, and a 'Ty-Rock' full floating screen.



Easy-running idlers on sectional belt conveyor by Mavor & Coulson, Ltd.

Stand A.19.—**Geo. W. King, Ltd.,** exhibit overhead chain conveying systems, including working 'Power-Pulled,' 'Power-Pulled Junior' and dual duty conveyors, the last-named with indexing and stroker mechanism. Also shown is a working slat conveyor and a working twin-screw-type floor conveyor.

A working electric overhead crane fitted with latching equipment and incorporating a 'Marvex' chain pulley block in the crab is another feature together with an all-electric travelling crane crab, and the 'Safelec' busbar system for track electrification, and various ancillary equipment for mechanical handling.

The 'Mytemin' electric chain pulley blocks are also displayed, operating on 'Supertrack' overhead runways, and the 'Marvex' electric chain pulley block operating on an overhead runway by remote automatic control.

A Mavor & Coulson belt conveyor driving gear with hold-back.

Stand C.13.—**Lyte Ladders, Ltd.,** exhibit a selection of 'Lyte' patent aluminium ladders on this stand, including singles, extensions and special types for fruit packing, rick ladders, &c. In addition, a range of 'Lyte' patent aluminium step and platform ladders for agricultural, horticultural, industrial and home use is shown. Also on view are non-ferrous castings, including road studs, &c.

Stand A.46.—**Mavor & Coulson, Ltd.,** exhibit sectional belt conveyors, low-friction grit-proof idler rollers, and a 20 H.P. driving gear. The idlers are made for belts from 12 to 60 in. wide, and with three or five pulleys to the set. Friction is reduced to the lowest possible amount with any type of bearing by specially made ball bearings and by the method of mounting.

A life-size cut-out photograph explains how simply these sectional belt conveyors can be installed and extended, and a compact driving gear for belt conveyors is shown. It is made in various widths, to take belts up to 36 in. wide. With a 1,000 r.p.m. motor it can transmit 20 H.P. when the belt speed is 400 ft. per min. Larger driving gears are available for greater power, up to a size that can transmit 200 H.P.

Stand A.12.—**R. H. Neal & Co., Ltd.,** exhibit the new type 'GM' 15 cwt. mobile crane and type 'QM' 4/6 ton mobile crane. A travelling mechanism provides excellent mobility on the 'GM' and hydraulic controls give flexibility in operation. Both normal jibs and telescopic masts are available, and the crane will travel with the jib or mast in any position. A wide range of varying types and lengths of jibs can be fitted to the 'QM' providing for the needs of almost any undertaking. The 'QM' crane can also be used for grabbing duties. It has a diesel power unit and the 'Neal' patent safety hoist device and patent differential freewheel are incorporated, as is also power-assisted steering.

Stand B.29.—**Power Jacks, Ltd.,** feature the Newton 'Hydratruck,' which has a number of impressive features, such as small overall dimensions, light weight, manœuvrability, and a lifting range from 7 in. to 4 ft. 8 in. Ten cwt. is easily elevated by hand to the maximum height in under 1 min. Power operation reduces lifting time to 25 sec. The platform is raised by means of a hand-operated hydraulic pump and jack, but alternative power operation is available.

Included in the exhibit is a range of hydraulic pumps and jacks from 1 to 10 tons capacity and up to 42 in. stroke. This equipment is fitted to many lifting trucks, portable elevators, tipping trailers, and industrial load handling plant.

In addition to the hand operated pumps and jacks, the exhibit includes motorised radial type pump units, together with a selection of double acting jacks, retracting jacks, and double telescopic jacks.

Stand A.16.—**Ransomes, Sims & Jeffries, Ltd.,** exhibit the 'Forklift 40' battery electric fork truck, capacity two tons, at 1 ft. 6 in. centres from heel of forks. The lift is 10 ft., but it is also available with 8 ft., 12 ft. or 14 ft. lift. This has a 20-cell Exide ironclad TL.15 battery.

The 'Forklift 20' is also shown, and the 'E.N.U.S.' 2-ton capacity industrial truck with an elevating platform 5 ft. by 2 ft. 2 in., by 11 in. high in the lowered position. The 'N.U.' crane truck, which has a hoisting capacity of 10 cwt. at 5 ft. radius, is another exhibit, as is the 'TE' electric tractor, which is capable of hauling weights up to 30 cwt.

Stand D.36.—**The Rawlplug Co., Ltd.,** exhibit the following products: Rawlbolts—a heavy-duty dry fixing which eliminates grouting in, shown in two types, loose bolt and bolt projecting, in convenient sizes from ¼ in. to 1 in. dia.; 'Rawlplugs,' the universal fixing for all sizes of screws and coach screws from No. 3 for light wiring, to No. 30 which will take a load of four tons; 'Rawltools,' for efficient hole boring in all materials, 'Stardrills,' wall boring and tubular boring for hand percussion; mechanical, electrical and pneumatic for mechanised percussion; durium tipped masonry rotary drills for use in a hand brace; R.P.1 slow-speed electric tool for use with durium drills.

Also shown are 'Rawlties,' 'Rawloops' and 'Rawlhangers'—new devices for speedy erection and dismantling of timber formwork used in building construction. Demonstrations are given daily.

Stand H.6b.—**Rozalex, Ltd.,** demonstrate on their stand how their product can be used as an effective means of combating the perpetual wastage of manpower caused by industrial dermatitis. Merely by rubbing a little Rozalex into the skin before bringing the hands into contact with any irritant, the worker is afforded complete protection against dermatitis. At the end of the day, a wash with ordinary soap and water is sufficient to remove all the grime that may have accumulated, leaving the skin clean and healthy. A full range of Rozalex barrier preparations is on show, together with the 'Rex' dispenser, which ensures a controlled and economic supply of Rozalex to each person whenever required.

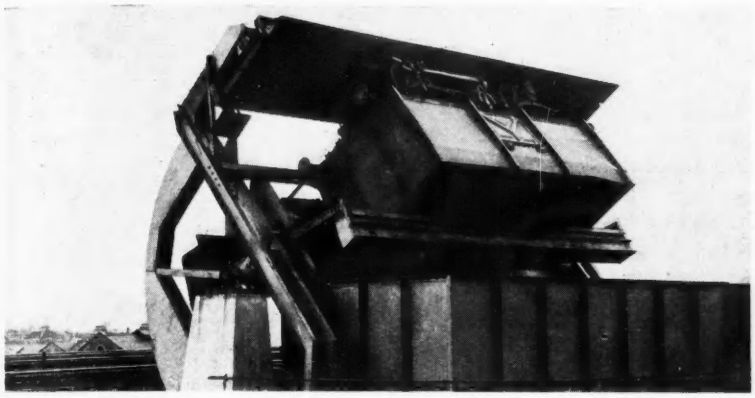
A Ransomes electric tractor, type TE.

Stand G.3.—**Spencer (Melksham), Ltd.,** have as the principal feature of this stand a small pneumatic plant of the type supplied by this firm for handling various types of free-flowing materials. The plant which can be seen operating is of the open-circuit type, with alternate pipe lines either taking from the top of a hopper by means of a special nozzle which can be lowered into the material, as used in discharging ships, barges, wagons, &c., or by means of a pipe line from the bottom of the hopper as frequently used for transferring material from a hopper to a position some distance away.

The transport pipe lines deliver to the receiver and are both fitted with a patent slide to allow either to be brought into operation. The air is separated from the material in the receiver, the material being delivered through a rotary discharger or air lock by means of a chute to a vertical belt and bucket elevator and thence to a hopper over the intake point, the air passing through the pump to atmosphere.

Stand A.7.—**Steels Engineering Products, Ltd.,** have as the main feature of their stand the new 20-ton mobile crane

which follows the usual Coles practice of a self-propelled, fully mobile crane mounted on pneumatic tyres, with a fully slewing superstructure able to turn 360° either way. The crane is fitted with the patented Coles reversible steering and is complete with limit switches and other well tried safety devices.



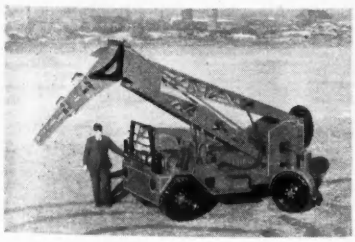
The 'Rotaside' wagon tippler by Strachan & Henshaw, Ltd.

Also shown is the Coles railway crane for container, traffic, a 1-tonner fitted with a special and ingenious bale stacking attachment, a similar model with the patented searcher jib for probing covered rail wagons or awkward corners, and an example of the 5-ton screw derrick crane.

A comprehensive range of Coles electric hoists is demonstrated, and the 'Electric Eel' industrial trucks are well represented.

Stand A.9.—**Strachan & Henshaw, Ltd.,** particularly feature a full-size working example of the 'Rotaside' wagon tippler which accommodates and automatically clamps during rotation railway wagons of varying sizes up to 20 tons capacity, though on the exhibit it handles a 16-ton steel wagon.

Other exhibits on the stand consist of models of other types of tippler and of skip hoists, the principal one being a working model of the patented angle hoist, in which the skip is first elevated up a steeply inclined track and then runs in horizontally over a range of bunkers to be discharged at any required point. A model showing the firm's system of dust trapping for use with tipplers is also shown.



A 'Jumbo' crane by F. Taylor & Sons (Manchester) Ltd.

Stand A.32.—**F. Taylor & Sons (Manchester), Ltd.,** feature the Taylor 'Jumbo' mobile hydraulic crane with its unique system of quickly attached tools for many different jobs. Considerable use has been made of the Taylor patent hydraulic grab. This grab is affixed to the end of the Taylor-Jumbo jib and is hydraulically controlled from the driver's cabin, and can be used with coal, sand, gravel, and other substances. A high rate of hoisting after loading is combined with a rapid and accurate positioning and exceptional ground speed and mobility.

An important factor is the long outreach of the jib, which easily carries the grab over and into every part of the truck. The grab is available in sizes from 1 to 2 cu.yd.

Stand A.18.—**John Thompson, Ltd.,** exhibit a small type 'Triumph' elevator suitable for feeding all types of shell boilers, and of the chain and buckle type and totally enclosed. Also shown is a conveyor suitable for the quenching and transport of ash, and clinker from either water tube, 'Economic' or 'Lancashire' boilers. The length of the trough can be arranged to suit the number of boilers to be ashed, and it is claimed that this conveyor quenches ash effectively, minimises abrasion, has a very low power consumption and maintenance costs, and is practically dustless and noiseless in operation.

Stand B.12.—**Tubewrights, Ltd.,** which is a subsidiary of Stewarts and Lloyds, show a representative selection of tubular steel stillages developed for British Railways, the jute, nylon and other industries.

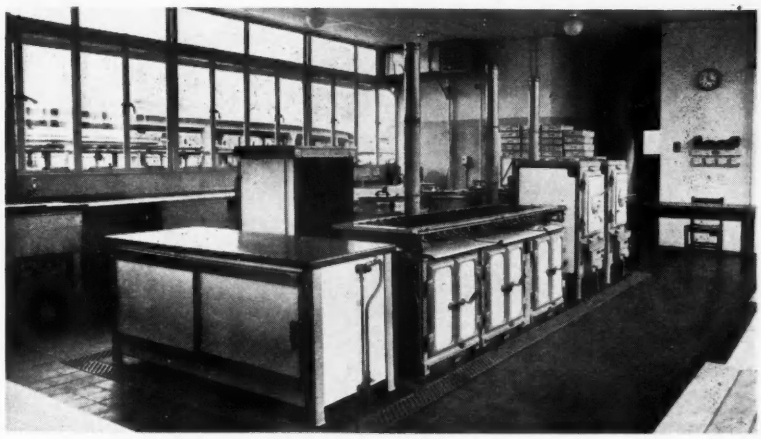
Also shown is a full range of photographs of the firm's tubular steel crane and dragline jibs ranging from 30 ft. to 120 ft., as well as other examples of the applications of steel tubes to mechanical handling problems, including tractor hoists and car loading gear for use at docks.

Stand A.1a.—**Hugh Wood & Co., Ltd.,** display a working troughed belt conveyor, 18 in. wide, of the type commonly used in industrial installations. The conveyor is fitted with the 'Huwood' patent oil-filled, self-lubricating idlers. The drive head is a standard industrial type '5N' unit, having a nominal rating of 5 H.P., and suitable for belt widths up to 20 in.

Shown also is a 25 H.P. industrial drive head, suitable for belt widths up to 36 in., along with an intermediate conveyor section, type 3 EFT. The drive heads are typical of a range of standard units varying in size up to 200 H.P. In addition, there is on show an industrial tension end of the pulling jack type, and a complete range of 'Huwood' three-pulley and five-pulley troughing idlers, including samples of the rubber-covered impact and abrasion resisting types.

Gasworks Visits.—In accordance with their policy of making periodic visits to the various gas undertakings in their area of supply, the members of the North Eastern Gas Board visited the workers at Whitby, Filey, and Scarborough.

GAS IN THE SERVICE OF HEALTH



This heavy duty cooking equipment, manufactured by the Crittall Kitchen Equipment Co., Ltd., is installed in the kitchen of the new Medical Research Centre recently opened by the National Institute for Medical Research at Mill Hill in the North Middlesex District of the North Thames Gas Board.

RESEARCH AND THE USE OF TOWN GAS

IN the *Journal* of May 17 (pp. 469-474) we published a paper on 'Research and the Use of Town Gas,' which Mr. W. A. Simmonds, B.SC., A.INST.P., of the Gas Research Board, presented to the Midland Junior Gas Association on April 18. Following are the references:

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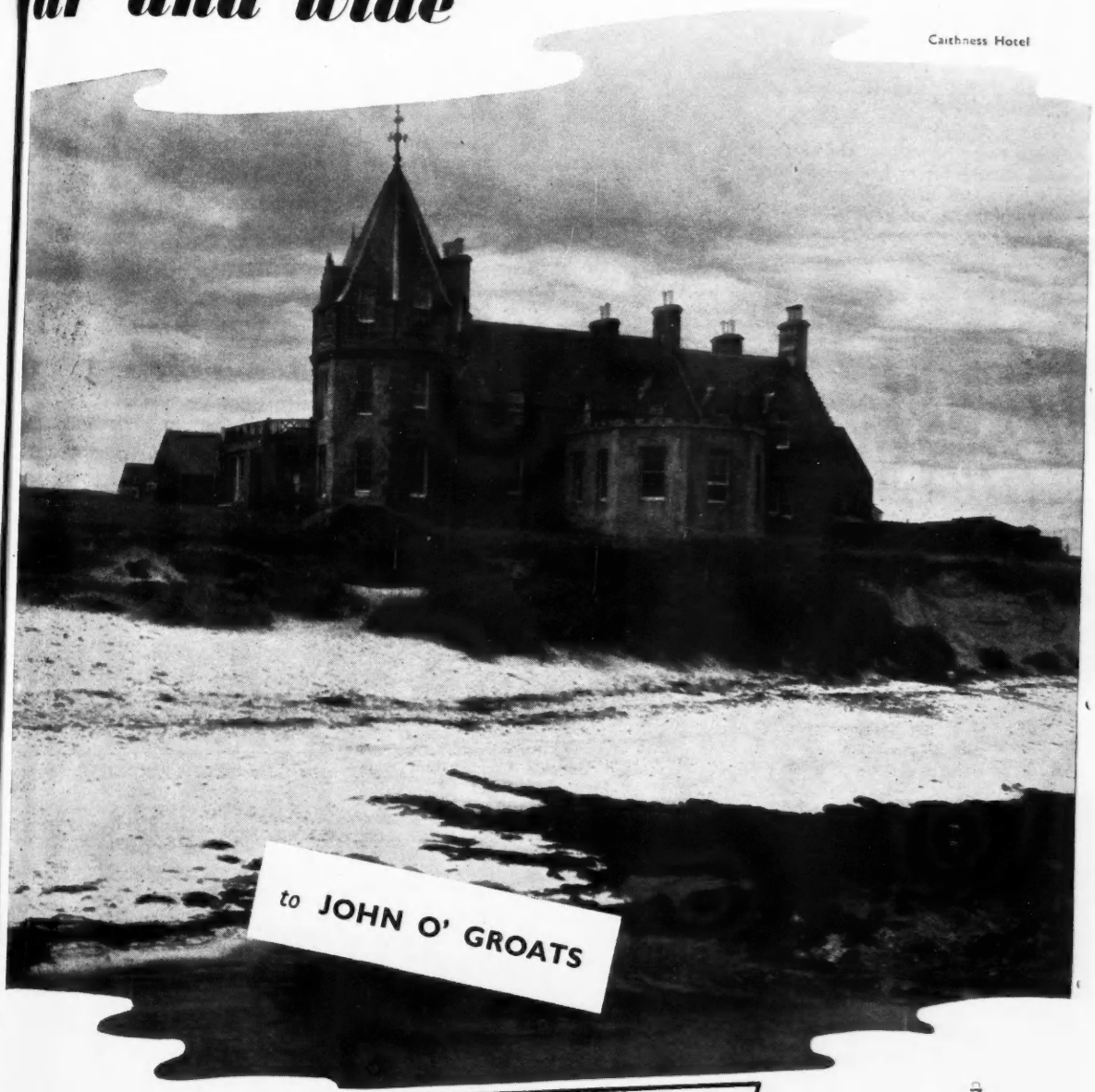
GAS SECTION, B.I.F.

Manufacturers who exhibited at the British Industries Fair, Castle Bromwich, in the gas section, which was revived this year for the first time since before the war, express themselves as generally well satisfied with the interest shown in their stands and the number of enquiries for their products. On the Gas Council stand, enquiries showed an increase of approximately 25% over the 1949 figures and covered a wide range of manufacturing processes, in addition to commercial and domestic equipment. A number of enquiries were from overseas buyers. Technical journals over a wide field have given prominence to the exhibits in the gas section and to the Gas Council stand, the planning and design of which attracted favourable attention.

During their recent visit to Partington works, Manchester, Sir Edgar Sylvester and Colonel Smith were introduced to key officials and representatives of the workers and staffs of the Manchester undertaking. In the centre foreground (left to right): Colonel Smith, Sir Edgar, and Colonel W. Moncrieff Carr, Chairman of the North Western Gas Board. Also included in the group are Mr. A. Henshall, Deputy Chairman of the board, Mr Biddulph Smith, Partington Station Engineer, Mr. E. W. Tame, member of the board, and Mr. J. Wilson, Manchester Group General Manager.

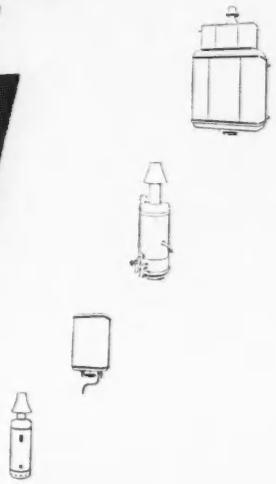
far and wide

Caithness Hotel



appliances

COOKERS · SPACE HEATERS · WATER HEATERS



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Permac
METAL-TO-METAL JOINTING MATERIAL

Ever since 1913 "PERMAC," the original Metal-to-Metal Jointing, has been holding up difficult joints in Gas Works and on Coke Oven Plants all over the world. Equally suitable for any joint—steam, water, gas, oil, benzol, ammonia, etc.—screw pipe or flange.

Instant full pressure when the joint is made

THOMAS & BISHOP LTD

TRADE NEWS

British Paints, Ltd., have changed the address of their London office from Leadenhall Street to Crewe House, 15, Curzon Street, London, W.1. (Telephone: Grosvenor 6401/5.)

To provide a comprehensive guide and to assist in choosing the correct detergent for any specific cleaning task, **Joseph Crosfield & Sons, Ltd.,** Warrington, Lancs., have issued a booklet entitled *Crosfield Detergents in Modern Industry*. The review, which is exceptionally well illustrated, covers a wide range of industrial uses, but particular interest will be found in that section which is concerned with engineering trades. Copies are freely available on application to the Company.

One of the largest road transport loads for some time was delivered on May 17 to the works of **Electrolux, Ltd.,** at Luton. The load was the shell of a new 500-ton capacity power press which, when installed, will do three tooling operations at once in turning out a side of a refrigerator at each stroke. Weighing well over 40 tons, the press was two days on the road, and was escorted by police cars through built-up areas. This addition to the works capacity will assist Electrolux, Ltd., to speed up their production of gas-operated refrigerators.

A mobile plant to undertake the contract cleaning of Lancashire boilers and similar plant has been manufactured by the **British Vacuum Cleaner and Engineering Co., Ltd.,** Goblin Works, Leatherhead. Built on a short chasis Scammell lorry, it comprises a primary cyclone with rotary valve discharging into a two-way sacking chute, two intermittent cyclones and two with 36-in. filters with bucket containers, also an eight stage turbo exhauster. Power is provided by a 12/24 h.p. water cooled Morris motor. A hand-operated valve is fitted to allow one sack to be emptied while the other is in use, an important addition since it takes only 40 sec. to fill one 100-lb. sack. The cyclone is constructed and fitted with counter weights so that it can be folded down when the lorry is in motion.

Albright & Wilson, Ltd., manufacturers of phosphorus and phosphorus compounds, held their first sales convention for foreign agents last month. Eighteen delegates attended from Belgium, Denmark, Finland, France, Holland, Italy, Norway, Spain, Sweden, and Switzerland. Discusions were held with members of the Company's sales office staff and the delegates described the trading conditions in their respective countries. The delegates were then taken to Stratford-on-Avon, from which visits were made to the Company's works at Oldbury and at Widnes. Talks and practical demonstrations were given by the Company's technical staff and the delegates were shown over the plants. During the following week-end the delegates were taken to places of interest in Stratford. The convention, which concluded with a farewell luncheon in London, presided over by Mr. John Christopherson, Sales Director, marked the Company's growing importance in the export field, where its sales have increased by several times in the last decade.

The Bristol depôt of the National Benzole Company, Ltd., is now situated at Albert Road, St. Philips, Bristol. (Tel.: Bristol 76112 and 75401.)

This display unit will accompany the marketing of a new pressure cooker. Specially designed by L. G. Hawkins & Co., Ltd., 30, Drury Lane, W.C.2, for use on gas cookers with a convex base for maximum efficiency, the appliance uses a balanced vent weight to maintain constant pressure.

Elliott Brothers (London), Ltd., mechanical and electrical engineers, announce that arrangements have recently been concluded with the Fisher Governor Company of Marshalltown, Iowa, U.S.A., for the manufacture in England of the full range of Fisher automatic control specialities. A new English company, **Fisher Governor Company, Ltd.,** has been formed, whose registered office is at Century Works, Lewisham, London, S.E.13, to market Fisher products in Great Britain, Europe and the British Commonwealth (except Canada). It is emphasised that the English products are in every way consistent with the American company's specifications and made under the same high standards of quality control. Interchange of technical staff between the two companies has been carried out in accordance with a policy of complete co-operation in every detail of manufacturing technique. Fisher-trained engineers are now available in England for the guidance of users of the equipment, and the close co-operation between the two plants ensures full interchangeability of English and American components. The English company has published an illustrated leaflet which describes briefly the current range of Fisher products. This comprises diaphragm control valves, pressure regulators, liquid level controllers, lever valves, gas regulators, and inner valves. Further details of all items can be obtained on request.